OPERANT STUTTERING: THE CONTROL OF STUTTERING BEHAVIOR THROUGH RESPONSE-CONTINGENT CONSEQUENCES[1]

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The attempt to understand and control stuttering has received considerable attention in both clinic and laboratory. The concept of anxiety has played a major role in formulations in both areas; stuttering is considered "an anxiety-motivated avoidant response that becomes 'conditioned' to the cues or stimuli associated with its occurrence" (5).

This study reports a preliminary investigation designed to explore the extent to which stuttering can be brought under operant control.

Three male stutterers from the speech clinic, ages 15, 22, and 37, served as S's. The S read from loose printed pages; every time he stuttered, E pressed a microswitch which activated an Esterline-Angus recorder. A check was run by turning the microswitch over to another E, who had not been informed of the nature of the experiment, and instructing him to press upon each moment of stuttering. The E observed S through a one-way mirror in a room adjoining the experimental room, and heard him through a sound-amplification system.

When a curve of stuttering frequency considered smooth was obtained, E turned a switch which initiated a 30-minute period of response-contingent stimuli. After this period, S was observed for another 30 minutes without such stimuli following each press of the microswitch. No specific S^D's were introduced to differentiate periods. A constant noise level of 60 decibels was present throughout the experiment.

Response-contingent periods were of two kinds. During the aversive period, every depression of the microswitch which activated the recorder also produced a 1-second blast of a 6000-cycle tone at 105 decibels in S's earphones. During the escape period, such a blast was constantly present; every depression of the microswitch shut off the tone for 5 seconds. Such use of noise as an aversive stimulus which was contingent upon responding or which could be escaped by responding followed a procedure used by Azrin (1).

[1] The authors wish to express their appreciation to Dr. Chester J. Atkinson, of Southern Illinois University, for his assistance with equipment problems and active interest during the course of the study.

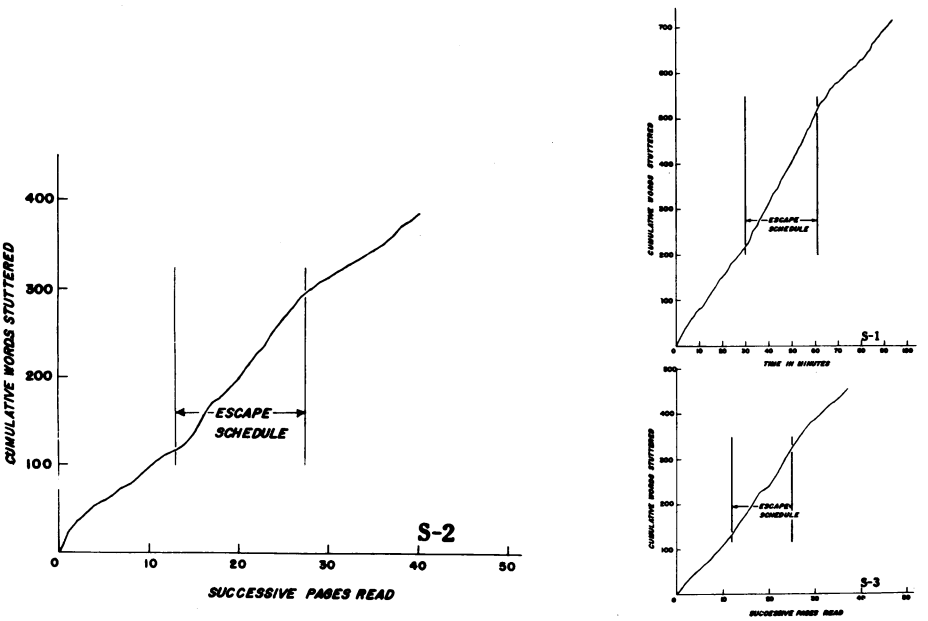

Fig. 1. Escape periods.

Each S was run on two consecutive days. For S-1, the escape period was presented on the first day, and the aversive on the following day. For S-2 and S-3, the order was aversive-escape.

Record was kept not only of stuttering frequency, but also of elapsed time and number of pages of copy read. Data are presented in the accompanying figures. For all S's, the ordinate is cumulative words stuttered. For S-1, the abscissa is time, producing rate curves. For S-2 and S-3, however, the abscissa is number of pages read, and the curves depict stutters per page read.

Curves for sessions containing escape periods are presented in Fig. 1. For all S's, stuttering increases when escape from the tone is made contingent upon stuttering. When the tone is turned off, stuttering is no longer followed by such consequences, and the rate drops. All S's display short interludes of diminished rate, characterized by irregularities in the curves. All sessions open with a high-burst stuttering activity. This concurs with findings of "adaptation" studies in stuttering (7).

Curves for sessions containing aversive periods for S-1 and S-3 are presented in Fig. 2. Making presentation of a blast contingent upon stuttering tends to depress the rate of stuttering during such a period in a marked manner; S-1 seems to have been moving toward an asymptote of complete suppression. The compensatory rise previously noted (2, 8) following cessation of aversive consequences is pronounced in both S's. The adaptation burst is again present.

The aversive-period session for S-2 is presented in Fig. 3, which depicts total suppression of stuttering during the aversive period, and beyond. The period during which definition of stuttering was turned over to another E is designated under the

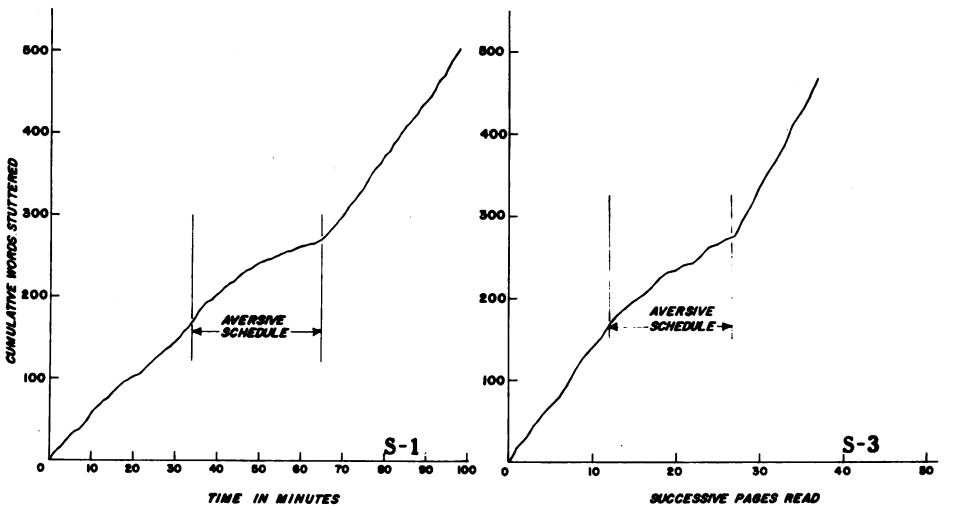

Fig. 2. Aversive periods for S-1 and S-3.

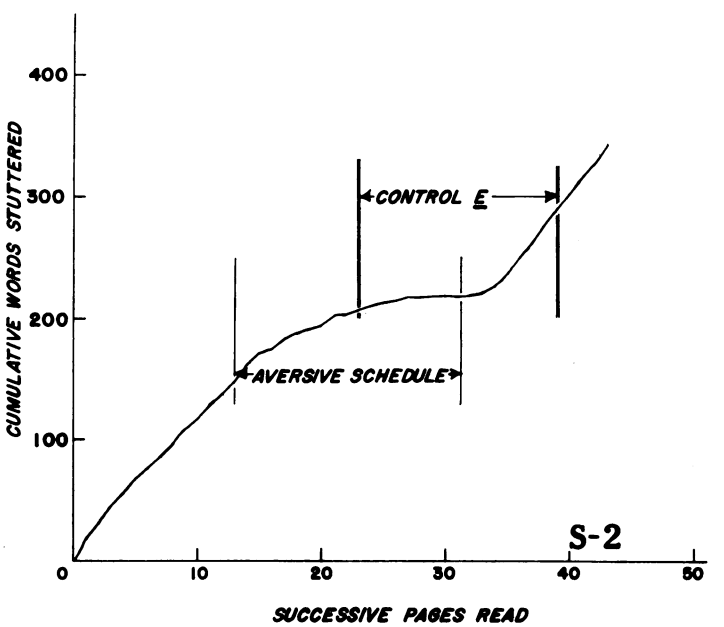

Fig. 3. Aversive period for S-2.

heading, Control E.[2] There is no discernable effect on response rate, arguing for the validity of the major E's judgment of stuttering. The adaptation burst is again present.

Comparisons of the various figures tend to indicate that number of pages read can apparently be equated with time as a component of rate. Such an equation would follow if rate of reading itself, that is, pages per unit of time, were constant. For S-2 and S-3, the mean reading times in minutes per page are:

	Base line	Escape	Final	Base line	Aversive	Final
S-2	2.20	2.12	2.07	2.28	2.10	2.30
S-3	2.48	2.30	2.42	2.50	2.65	2.75

The only safe conclusion seems to be that S-3 reads more slowly than S-2; the apparent randomness of the data suggests constancy in reading rate.

The data presented suggest that the stuttering response is an operant which occurs in the context of another operant, namely, verbal behavior. Although one cannot stutter without talking, neither can one limp without walking, and limping can be controlled separately from walking. Reading rate was apparently not systematically affected by the response-contingent stimuli which controlled stuttering, hence the two are separable responses. The operant nature of reading has been discussed elsewhere (9); the way in which stuttering responses reacted to operant controls in this study can not be distinguished from reactions of other operant behaviors, and suggests that they are in this class of behaviors.

When termination of a noxious stimulus was made contingent upon stuttering, response rate rose. When onset of a noxious stimulus was made contingent upon stuttering, response suppression occurred, displaying compensation upon cessation of such consequences. For one S, the response was completely suppressed, and this suppression continued beyond the termination of the aversive contingency. Where S avoids certain consequences by suppressing a response, the suppression will be maintained by absence of the consequences. Accordingly, elimination of the consequences by E will tend to maintain the suppression. The adaptation effects reported in the speech literature were found here. These consist of an initial burst of stuttering, which then "adapts out," that is, drops to a base-line rate. These curves have been considered similar to respondent extinction curves (10), although classical extinction is not obtained (cf. 7). Consideration of conditions related to the establishment of an operant base line would involve a stuttering response being occasioned by S^{D}'s. Placing a stutterer in a speech clinic with instructions to speak is not a procedure calculated to diminish generalization of the S^{D}'s to new stimuli present in the experimental session. The response rate should rise. As the experiment progresses, and no new consequences are applied to responses occasioned by the new S^{D}'s, we are establishing conditions for discrimination of new from old S^{D}'s; the new stimuli lose their control; the situation is "perceived as familiar," or "perceived as non-threatening." Operant discrimination involves operant extinction of responses to S, the new S^{D}'s.

Concerning the relationship of stuttering to anxiety, presumably of a respondent type, anxiety is associated with the suppression of operant behavior (3); stuttering behavior was both suppressed and intensified, and these changes are explainable on an operant basis. Since the stuttering response can be isolated from regular

[2] Both E's are speech therapists. The major E is a stutterer who has had 7 years of experience as a speech therapist specializing in stuttering.

speech as a unit of response, we might speculate that such isolation would come about through differential consequences applied to breaks in speech, and smooth speech. Such differentiation might relate to the anxiety of the parent (rather than the child) upon hearing a stuttering response. She may reinforce the behavior by becoming attentive, and should she later decide to extinguish by ignoring, the usual burst of increased stuttering behavior during onset of extinction (4, 6) might increase her anxiety, lead to remorse, reinstatement of reinforcement-- and the establishment of a variable-interval schedule making extinction all the more difficult.

If further research supports the operant analysis presented here, then it would seem that controlled alteration of such behavior, that is, therapy, would involve application of procedures from the experimental analysis of operant behavior, notably of responses reinforced on a variable-interval schedule.

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